



**IN THE UNITED STATES PATENT  
AND TRADEMARK OFFICE**

Serial No. : 10/790,931  
Applicants : Takemori TAKAYAMA et al.  
Filed : March 1, 2004  
For : ROLLING ELEMENT AND METHOD  
OF PRODUCING THE SAME  
Art Unit : 1742  
Examiner : Deborah YEE  
Docket No. : 04005/HG  
Confirm. No.: 3234  
Customer No.: 01933

**INFORMATION DISCLOSURE STATEMENT**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

**MAIL STOP AMENDMENT**

S I R :

Submitted herewith are the following:

(1) An English-language translation of an Office Action which issued in a Japanese application corresponding to copending application Serial Nos. 10/641,362; 11/154,919 and 11/154,918;

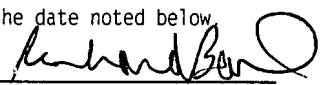
(2) copies of Japanese publications cited in the enclosed aforesaid English-language translation of a Japanese Office Action;

(3) copies of publications cited in an Office Action dated February 18, 2007 in Serial No. 11/235,435, which is the

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on the date noted below.

  
Attorney: Richard S. Barth

Dated: March 30, 2007

In the event that this Paper is late filed, and the necessary petition for extension of time is not filed concurrently herewith, please consider this as a Petition for the requisite extension of time, and to the extent not tendered by the attached Form PTO-2038, authorization to charge the extension fee, or any other fee required in connection with this Paper, to Account No. 06-1378.

divisional application of the above-identified application;

(4) Form PTO/SB/08A; and

(5) Form PTO-2038 in the amount of \$180.

It is respectfully requested that the Examiner return an initialed copy of the attached Form PTO/SB/08A to the undersigned to confirm that the publications listed therein have been considered and made of record.

Respectfully submitted,

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Encs.: (1) English-language translation of  
Japanese Office Action  
(2) Form PTO/SB/08A  
(3) Copies of the publications cited on said  
Form PTO/SB/08A  
(4) Form PTO-2038

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PTO/SB/08A (08-00)

U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE

Substitute for Form 1449A/PTO  <b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b>			Application Number	10/790,931	
			Filing Date	March 1, 2004	
			First Named Inventor	Takemori TAKAYAMA	
			Group Art Unit	1742	
			Examiner Name	Deborah YEE	
Sheet	1	of	2	Attorney Docket Number	04005/HG

### U.S. PATENT DOCUMENTS

Exam. Inits*	Cite No <sup>1</sup>	Document Number	Kind Code <sup>2</sup>	Name of Patentee or Applicant	Publication Date MM-DD-YYYY	Relevant Portion

### FOREIGN PATENT DOCUMENTS

Exam Inits*	Cite No <sup>1</sup>	offc <sup>3</sup>	Document Number <sup>4</sup>	Kind Code <sup>5</sup>	Name of Patentee or Applicant	Publication Date MM-DD-YYYY	Relevant Portion	T <sup>6</sup>
		JP	10-259470	A	AICHI STEEL WORKS LTD; TOYOTA MOTOR CORP	09-29-1998		a
		JP	06-017224	A	KOBE STEEL LTD	01-25-1994		a
		JP	2000-265241	A	DAIDO STEEL CO LTD	09-26-2000		a
		JP	2000-301458	A	ISUZU MOTORS LTD; ANDOU HASHIRA	10-31-2000		a
		JP	2002-030344	A	ISUZU MOTORS LTD	01-31-2002		a

Examiner Signature		Date Considered	
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\* EXAMINER: Initial if document considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

<sup>1</sup> Unique citation designation number. <sup>2</sup> See kinds of U.S. Patent Documents. <sup>3</sup> Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). <sup>4</sup> For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. <sup>5</sup> Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 16 if possible. <sup>6</sup> Place a check here if English translation is attached.

DATE: MARCH 30 2007

a ENGLISH-LANGUAGE ABSTRACT ENCLOSED.

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PTO/SB/08A (08-00)

U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE

Substitute for Form 1449A/PTO  <b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b>				Application Number	10/790,931
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		JP	6-25736	A	URITA et al.	02-01-1994		a
		JP	2-185954	A	SUMITOMO METAL IND LTD	07-20-1990		a
		JP	60-162726	A	OGINO et al.	08-24-1985		a
		EP	0 950 723	A1	KOMATSU LTD	10-20-1999		

Examiner Signature		Date Considered	
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\* EXAMINER: Initial if document considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

<sup>1</sup> Unique citation designation number. <sup>2</sup> See kinds of U.S. Patent Documents. <sup>3</sup> Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). <sup>4</sup> For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. <sup>5</sup> Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 16 if possible. <sup>6</sup> Place a check here if English translation is attached.

DATE: MARCH 30, 2007

a ENGLISH-LANGUAGE ABSTRACT ENCLOSED.

## NOTICE OF REJECTION

APPLICATION NUMBER: Japanese Patent Application No. 2002-240967

DRAFTING DATE: 2006-03-13

PRIMARY EXAMINER: Masanori Suzuki 3557 4K00

PATENT ATTORNEY: MR. Tsutomu Inoue

APPLICABLE PROVISION: Article 29 , paragraph 1; Article 29, paragraph 2;  
Article 36

This application has been rejected for the following reasons. Any inquiry concerning this communication should be submitted within 60 days from the mailing date of this communication.

### REASONS

A. The invention relating to the following claims of the present application is equivalent to the techniques disclosed in the following publications distributed in Japan or foreign countries prior to its filing date. Therefore, the invention has been determined to be unpatentable pursuant to Article 29, Paragraph 1, Number 3 of the Patent Law.

B. The invention relating to the following claims of the present application could be easily made by those having ordinary skill in the art before its filing date based on the techniques disclosed in the following publications distributed in Japan or foreign countries prior to the filing date. Therefore, the invention has been determined to be unpatentable pursuant to Article 29, Paragraph 2 of the Patent Law.

C. This application has revealed that its specification and drawings do not meet, in the following points, the requirements of Article 36, Paragraph 4 and Paragraph 6, Number 2 of the Patent Law.

### DESCRIPTION (cited references are shown in the following list)

- Reasons A, B
- Claim 1

- Cited reference etc. 1
- Remarks

Cited reference 1 describes a gear made from a steel material having a composition which falls within the composition range prescribed in claim 1 of the present application and which satisfies the relational expression disclosed in claim 1 of the present application. This steel material is carburized such that the carbon concentration of the carburized surface layer becomes 0.75% and is then subjected to quenching and tempering at a temperature of 300°C or less (Claim, 0044, Table 2, Table 3 (steel type I)).

In addition, since the gear has the same composition and is manufactured in the same process as disclosed in claim 1 of the present application, the gear is considered to have a hardness of HRC58 or more by virtue of the tempering process at 300°C.

According to the paragraph 0022 of the specification of the present application, it is stated that the members which are provided in the tooth flanks, dedenda and tooth bottoms of the rolling element through mechanical pressurization treatment are within the scope of the present invention. However, it is a known technique to apply mechanical pressurization treatment to a rolling element such as gears with the intention of improving its mechanical properties (see JP-A-2000-301458, JP-A-2002-30344).

- Reason B
- Claims 2, 6
- Cited references etc. 2, 3
- Remarks

Cited reference 2 describes a carburized bearing member which exhibits good rolling properties at high temperatures. This bearing member is made from a steel member having a composition which falls in the composition range prescribed in claims 2, 6 of the present application and which satisfies the relational expression disclosed in claims 2, 6 of the present application. This steel material is carburized with a carbon potential of 1.2 wt% and then subjected to quenching and tempering at 300°C or less. By virtue of

tempering at 300°C, a hardness of HRC62 is ensured (Claims, 0029, Table 1, Table 2 (steel No. 3)).

Cited reference 3 is associated with a carburizing process for gears which require surface hardening. According to this process, a steel containing C: 0.05 to 1.2 wt% and Si: 0.05 to 2 wt% is carburized so as not to create coarse cementite. After cooled down to 500°C or less, the steel is reheated to the AC 1 point or more and then quenched, whereby cementite particles having a diameter of 1  $\mu$ m or less are precipitated in the surface area (Claims, 0045). Further, the following descriptions are given: "The increase of carbon solid solubility at high temperature is utilized for creating a high-carbon austenite structure. Then, a supersaturated structure (martensite, bainite or a combination of them) is created, while cooling the steel material so as to prevent pro-eutectoid cementite precipitation which occurs at the time of cooling. This structure is reheated and then quenched whereby dispersed cementite particles, which are much finer and much more uniform than ever before, can be created." (0014); "The treatment can be performed at higher speed than the ordinary carburization, by taking advantage of the high-temperature treatment and the nonprecipitation of cementite during carburization." (0016)

Although it is not clearly stated in cited reference 2 that the carbon concentration of the carburized surface layer is adjusted to 0.9 to 1.5 wt% by the carburizing process, there is a high possibility in view of the carburizing performed with a carbon potential of 1.2 wt% that the carbon concentration of the penetrating surface layer is a bit less than 1.2 wt%.

The technique disclosed in cited reference 2 does not include a process in which the steel material is cooled down to the A1 transformation temperature or less subsequently to carburizing and then reheated and a process in which fine cementite particles having a size of 1  $\mu$ m or less are dispersed in the martensite structure of the carburized surface layer. However, it is not difficult for a person skilled in the art to get an idea from cited references 2, 3, which idea is such that, in order to speed up the carburizing process while further promoting surface hardening of the bearing surface, fine cementite particles having a size of 1  $\mu$ m or less are dispersed in the martensite structure of a

carburized surface layer by carburizing the steel material without cementite precipitation and then cooling it to the A1 transformation temperature or less, followed by reheating and quenching.

In the paragraph 0022 of the specification of the present application, it is stated that the members which are provided in the tooth flanks, dedenda and tooth bottoms of the rolling element through mechanical pressurization treatment are within the scope of the present invention. However, it is a known technique to apply mechanical pressurization treatment to a rolling element such as gears with the intention of achieving an improvement in its mechanical properties (see JP-A-2000-301458, JP-A-2002-30344).

- Reason B
- Claims 5, 8, 9
- Cited references etc. 4
- Remarks

Cited reference 4 describes a non-heat treated steel for use in gears. This steel is made from a steel material having a composition which falls within the composition range prescribed in claims 5, 8, 9 of the present application and which satisfies the relational expression disclosed in claims 5, 8, 9 of the present application. The steel material is subjected to induction hardening such that the temper hardness of it at 300°C after hardening is HV668 (HRC58 or more) (Claims, Table 1, Table 2 (No. 4)).

Although the steel material of the above technique is not subjected to tempering treatment at a temperature of 300°C or less after quenching, it has the same effects as of the invention disclosed in claims 5, 8, 9 of the present application. In addition, it is conceivable for a person having ordinary skill in the art to apply tempering treatment after hardening in order to obtain desired properties and to apply low temperature tempering (at 300°C or less) in order to produce a product which is required to be hard in its surface.

In the paragraph 0022 of the specification of the present application, it is stated that the members which are provided in the tooth flanks, dedenda and tooth bottoms of the rolling element through mechanical pressurization



treatment are within the scope of the present invention. However, it is a known technique to apply mechanical pressurization treatment to a rolling element such as gears with the intention of achieving an improvement in its mechanical properties (see JP-A-2000-301458, JP-A-2002-30344).

· Reason C

1. The subject matter of Claims 1 to 10 of the present application resides in “the steel material containing one or more alloy elements selected from Mn, Ni, Cr, Mo, V, Cu, W, Ti, Nb, B, Zr, Ta, Hf, Ca; unavoidable impurities such as P, S, N, O; and balance substantially consisting of Fe”. Among the above elements, the amounts of W and Ca to be added are not concretely explained in the description of the specification. It is also unexplained what kinds of elements exist as the balance except Fe.

2. The technical significance of the formula described in claim 3 (and its dependent claims 4, 10) and claim 7 (and its dependent claims 9, 10) of the present application cannot be understood from the description of the specification.

3. In the present application, Sample Nos. P2 – 4, 6 in Table 3 disclosed in the paragraph 0073 of the specification are included in the invention of claim 5, and Sample No. P7 in Table 3 is included in the invention of claims 7, 8. The temper hardnesses of these samples at 300°C are no more than HRC55.

**List of Cited References**

1. JP-A-10-259470
2. JP-A-6-17224
3. JP-A-8-3629
4. JP-A-2000-265241